CAN TAX REVENUES GO UP WHEN TAX RATES GO DOWN?

Don Fullerton
Princeton University

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ABSTRACT

When Arthur Laffer and other "supply side advocates" plot the "Laffer Curve," a relationship between tax revenue and a particular tax rate, they draw an upward-sloping segment of the curve called the normal range, followed by a downward-sloping segment called the prohibitive range. The prohibitive range is said to exist because high tax rates stifle economic activity and encourage leisure pursuits. Since a given revenue can be obtained with either of two tax rates, government would act rationally by choosing the lower rate of the normal range.

This paper introduces a new curve which summarizes the combinations of tax rates and the responsiveness of the amount of labor supplied to tax rates that result in maximum revenues, thus separating the "normal area" from the "prohibitive area." Looking at labor tax rates and total revenue, for example, the tax rate that maximizes revenue will depend on the assumed labor supply response to taxes. A general-purpose empirical model of the U.S. economy is used to plot the Laffer curve for several response rates, and to plot the newly introduced curve using the labor tax example. Results indicate that the United States could conceivably be operating in the prohibitive area, but that the tax rate on U.S. labor income and/or labor supply response would have to be much higher than most economists have estimated.

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1. INTRODUCTION

Ever since Arthur B. Laffer first drew his famous curve on a napkin in a Washington restaurant six years ago, there has been considerable public debate about the possibility of an inverse relationship between tax rates and government revenue. As drawn in Figure 1, the curve plots total revenue against the tax rate and indicates that there are two rates at which a given revenue can be collected. The upward sloping portion of the curve is called the "normal" range and the downward sloping segment is the "prohibitive" range. The prohibitive range is said to exist because the high tax rates stifle economic activity, force consumers and businesses to barter, and encourage leisure pursuits. 1/ No rational government would knowingly operate on this range in the long run.

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questions. First, what is the position of the United States on the curve today? Second, what is the relationship between the location of the curve itself and critical numbers such as the appropriate factor (production input) supply elasticity? 5/ 6/

The next section offers a brief review of some salient points from the debate. A common aspect of previous studies is that a prohibitive range for some local or non-U.S. economy is always associated with particularly high tax rates, high factor supply elasticities, or both. The third section sets out the conditions under which, in the long run, a lower tax rate could result in higher revenues. These conditions are summarized in a new curve, plotting the appropriate factor supply elasticity against the tax rate. The fourth section describes the general equilibrium model used to simulate the effects of various tax rates. The estimations of these effects are in section five, and both the Laffer curve and the new curve are plotted for an example with a labor tax and labor supply elasticity. Section six provides some evidence on the value of the critical labor supply elasticity, and the last section concludes that to operate in the prohibitive range, the tax rate on labor income and/or the factor supply elasticity must be very high.

At various points in his analysis Wanniski suggests that the peak of the curve is at a 25 percent tax rate (page 260), and that the peak of the curve "is the point at which the electorate desires to be taxed" (page 98). 7/ He states that the welfare maximizing government would operate somewhere on the normal range with the size of its budget determined by standard cost-benefit analysis.

For the opposition, Kiefer (1978) asserts that there is no tax rate for the overall economy which can be measured on the horizontal axis, and that "the Laffer Curve represents a gross simplification of a major portion of macro-economics into a single curved line" (page 15). These arguments are not compelling either in view of the large number of economic models which oversimplify in order to comprehend and convey economic phenomena. Kiefer also reminds us that income and substitution effects tend to be offsetting. For example, though a reduction in his personal income tax rate gives the individual an incentive to work more and consume less leisure, this tax reduction also allows him to work less and consume more leisure while maintaining the same after-tax income. The tendency to work more is the substitution effect and the tendency to work less is the income effect.

Kiefer argues against overemphasis on the supply side, claiming that "by concentrating primarily on incentive and supply-side effects, the Laffer Curve largely ignores the actual

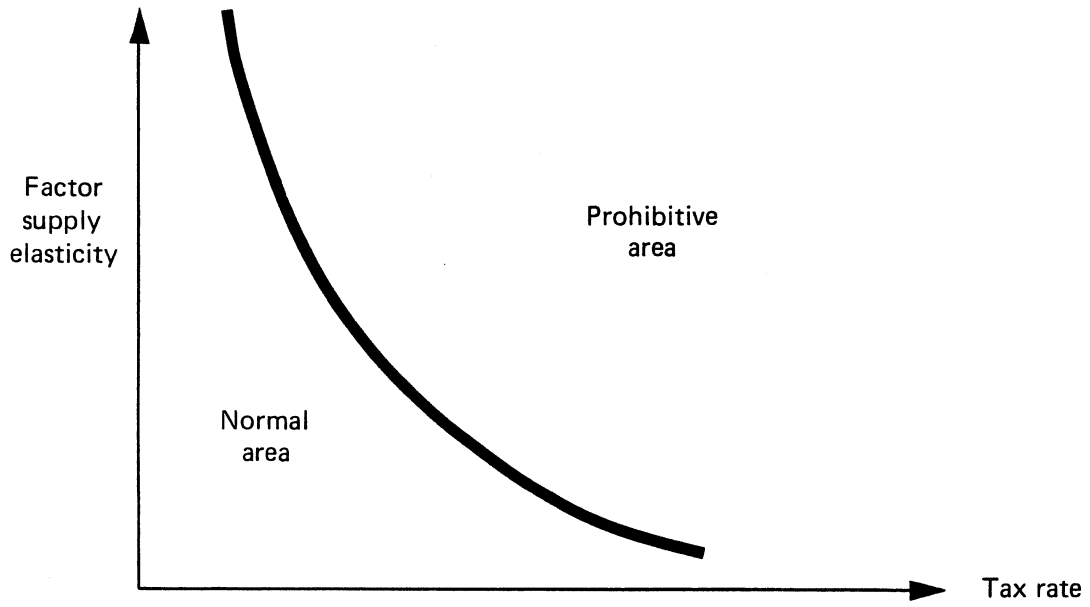
leisure, then income effects do not necessarily cancel. The second objection is that if a government does nothing other than tax labor and rebate the revenue to the laborers, then overall economic welfare will decrease. Clearly government will make people worse off if it taxes them into working less and then spends the tax revenue on something they could have provided just as well themselves. Thus these authors' model does not account for the inherent efficiency gain that occurs when government corrects market failure by providing a "public good." The benefits of consuming such goods spill over to other individuals who have not paid for them, so that private persons will not buy as much of them as their social benefits would justify. Police protection and street lighting are good examples. Since the private market for such goods does not allocate resources efficiently, government can increase consumer welfare by providing them. Thirdly, it is clear that some public goods like police protection may actually act to encourage private production. The labor taxes that reduce workers' desire to supply labor at a given wage may be spent by the government on public goods that cause producers to willingly increase wages in their attempt to hire more labor and increase output. Therefore, the "balanced budget" labor supply does not have to decrease with labor tax rate increases as these authors insist. Econometric estimates of how it responds will be surveyed in a later section. 11/

3. ANOTHER SIMPLE CURVE

A common feature of arguments from both sides of the debate is an implicit or explicit reference to factor supply elasticities. The offsetting income and substitution effects pointed out by Kiefer merely imply that the relevant supply elasticity might be low or negative, i.e., that the relevant factor supply may increase very little or even decrease in response to an increase in the net-of-tax wage. The emphasis on large incentives in the supply-side argument implies a large elasticity. The "open" nature of a local economy, i.e., the fact that labor and capital can move in and out of it more easily than they can move in and out of a national economy, implies a more elastic response to a local tax. Indeed, the entire debate reduces to the empirical matter of the size of the relevant factor supply elasticities. If they are high enough, people would reduce their work effort or investment so much in response to increased taxes that the economy could be on the prohibitive range.

The very location of Laffer's curve in Figure 1 depends on the supply elasticity of the factor being taxed. 12/ If that elasticity were fairly low, the total revenue maximizing point would be at a higher tax rate for that factor, and conversely. One can imagine a third dimension on that diagram giving different elasticity values. If one made the total revenue axis perpendicular to the page, the diagram's hill would be converted

Figure 2



those who say we are in the normal area believe they are lower, and those who deny the existence of the inverse relationship must believe that the supply elasticity is zero or negative.

4. THE GENERAL EQUILIBRIUM MODEL

To simulate the effects of different tax rates for a variety of factor supply elasticities, a previously developed general equilibrium taxation model is used. This model is still evolving after several years of work, and it has already been used for other purposes including the evaluation of various tax reform

allows savings to augment the stock in later periods. The elasticity of substitution between present and future consumption is based on an estimate of the savings elasticity with respect to the net-of-tax of return on savings. This elasticity is used because the after-tax rate of return on savings tells the individual how much extra future consumption he can get by sacrificing present consumption. For this value the 0.4 percent change in savings per 1 percent change in the rate of return as found by Boskin (1978) is used. The elasticity of substitution between consumption and leisure is based on an estimate of the labor supply elasticity with respect to the net-of-tax wage. For this value a 0.15 percent change in labor supply per 1 percent change in the wage is typically used, but relationships for different labor elasticity values will be derived below when the curve in Figure 2 is plotted.

The various Federal, state, and local taxes are typically modelled as tax rates on the value of purchases of appropriate products or factors. Corporate income taxes and property taxes are modelled as taxes on the use of capital that differ by industry because, for example, different proportions of industries are incorporated. Social security, workmen's compensation and unemployment insurance appear as taxes on use of labor. These rates differ by industry partly because different proportions of workers are subject to the social security maximum, but in 1973

There is a potential difference, however. The model used in this paper assumes government transfers are made to consumer groups in proportion to their observed 1973 receipts from social security, unemployment compensation, food stamps, and other welfare programs. Supply-side advocates may believe that these payments reduce the incentives of the people who receive them to work. The degree to which the supply-side advocates are correct depends on the program's ability to isolate important characteristics such as age, disability, and number of dependents which make the recipient unable to work. If the program successfully isolates those characteristics, its payments will have little or no disincentive effect. Our model does in fact treat them as having no disincentive effect. To the extent that larger disincentive effects exist due to transfer payments, higher tax rates should be used in describing the current U.S. economy. 18/

5. ESTIMATION

Supply-side advocates refer to several different types of taxes when they claim that an inverse relationship exists between a particular tax rate and government tax revenue. The curve in Figure 2 could be plotted by varying a product tax rate against the price elasticity of demand for that product, or by plotting capital tax rates against the elasticity of savings with respect to the net-of-tax return to capital. The latter example was

Table 1

Total Revenue Associated with Each Labor Tax Rate,
in Billions of 1973 Dollars

Tax Rate on Gross Income	Labor Supply Elasticity with Respect to Net-of-Tax Wage								
	.15	.50	1.00	1.50	1.75	2.00	2.50	3.00	4.00
-.111									341.79
.000								355.82	365.57
.048						354.00	357.46	360.56	365.93
.091	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00
.130					364.00	361.98	358.23		349.18
.167				369.80	365.17	360.85			
.200				370.82	363.62	356.91			
.231	439.48		391.82	369.60		350.57			295.40
.286			396.49	361.52					
.310			396.60						
.333	503.71		395.43						
.375			389.75						
.412	555.56	474.13	380.36						
.474	597.41	481.65							
.487		481.98							
.500	615.16	481.78	336.60						
.565	657.84	476.01							
.600	678.84								
.630	694.90								
.667	711.16								
.697	719.58								
.706	720.89								
.714	721.53								
.718	721.60								
.722	721.52								
.730	720.92								
.750	715.79								
.778	697.79								
.800	670.19								
.833	593.30								

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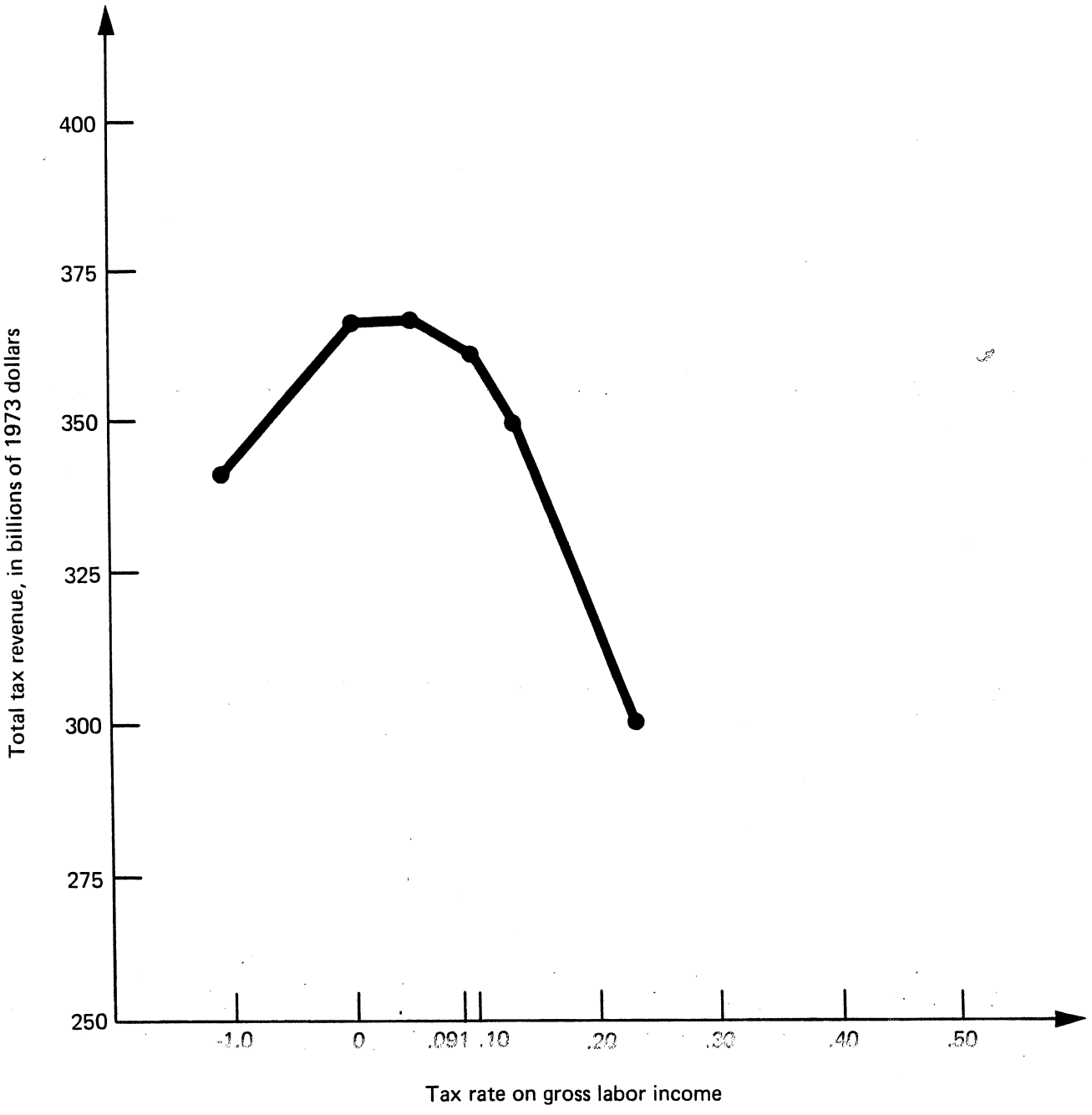
Simulations were made selectively to save computational expense. Not all possible rates are reported.

Figure 4

Laffer Curve with a 4.0 Labor Elasticity



The consistent 1973 data set, with adjustments described in section 4, shows a total tax revenue of $360 billion compared to a national income of $1,252 billion. 22/ These values are replicated in Table 1 for any possible labor supply elasticity, holding tax rates constant. Estimated revenues resulting from labor tax rates other than 9.1 percent will depend on the labor supply elasticity. Revenues in excess of $360 billion are rebated to consumers in proportion to their original after-tax income. These rebates are necessary because general equilibrium conditions require a balanced government budget, and increases in government purchases would influence the equilibrium solution. 23/

The results from over 60 experiments with different elasticities and tax rates are summarized in Table 1. 24/ The first column shows the total revenue resulting from different labor tax rates using the model's base value of .15 for the labor supply elasticity with respect to the net-of-tax wage. The "observed" total revenue of $360 billion corresponds to the base tax rate of 9.1 percent, and total revenues increase with tax rates up to a tax which is 71.8 percent of gross labor income. Beyond that rate, revenues start to fall. 25/

Any column of data from Table 1 can be used to plot an example of Figure 1, as is done in Figure 3 for the .15 elasticity. In any of these Laffer curve diagrams, the modelled U.S.

6. WHAT IS THE TRUE LABOR SUPPLY ELASTICITY?

The basic tax rates, including the .091 labor tax rate, were carefully calculated when the model was developed. However, estimates of the aggregate labor supply elasticity are harder to establish. The econometric literature gives many estimates for population subgroups, since different individuals will typically have different rates of response to a new net-of-tax wage. Finegan's (1962) occupational study found managers, craftsmen, and clerical workers varying from a -.29 to a +.42 percent change in labor supply per 1 percent increase in the net-of-tax wage, while Boskin's (1973) division by sex, race, and age found estimates from -.07 (for prime-age white males) to a +1.60 (for elderly black women). Since taxes generally do not vary with these characteristics, the relevant labor supply elasticity is an aggregate one. Table 2 summarizes a number of econometric studies and is based mostly on discussion in Killingsworth (1976).

There is a certain injustice to these authors in reporting their results in such a summary fashion. Each study has its own measure of the wage, its own data-year or time-period, and its own methods of estimation. The studies differ as to how they account for labor participation rates and as to whether they account for the "balanced budget" effects of government spending

Table 2

Estimates of the Labor Supply Elasticity

Authors	Data subset	Type of data	Range of Estimates
		For males	
Finegan (1962)	Male family heads	Inter-occupational	-.35 to -.25
Rosen (1969)	Male family heads	Inter-industrial	-.30 to -.07
Kalachek-Raines (1970)	Male family heads	U.S. cross-section	+.05 to +.30
Owen (1971)	Male family heads	U.S. time series	-.24 to -.11
Greenburg-Kosters (1973)	Poor male family heads	U.S. cross-section	-.16 to -.05
Boskin (1973)	Different male subgroups	U.S. cross-section	-.07 to +.18
Hill (173)	Poor male family heads	U.S. cross-section	-.32 to -.07
Ashenfelter-Heckman (1973)	Male family heads	U.S. cross-section	-.15
Fleisher-Parsons-Porter (1973)	Males ages 45-59	U.S. cross-section	-.25 to -.10
Ashenfelter-Heckman (1974)	Married males	U.S. cross-section	Zero
		For females	
Finegan (1962)	Females	Inter-occupational	-.095
Leuthold (1968)	Females	U.S. cross-section	-.067
Kalachek-Raines (1970)	Females	U.S. cross-section	+.20 to +.90
Boskin (1973)	Different female subgroups	U.S. cross-section	-.04 to +1.60
Ashenfelter-Heckman (1974)	Married females	U.S. cross-section	.87
		Aggregate	
Winston (1966)	Aggregate	International cross-section	-.11 to -.05
Lucas-Rapping (1970)	Short run aggregate	Time-series	1.35 to 1.58
Lucas-Rapping (1970)	Long run aggregate	Time-series	Zero to 1.12

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states or industries. These elasticities imply that one jurisdiction cannot charge higher tax rates than its neighbors, and they are perhaps becoming more and more applicable to nations because factor mobility across national boundaries is itself increasing. These latter considerations do not confirm the existence of a tax on the prohibitive range, but they make one much more plausible.

Finally, though the results of this paper tend to reject the notion of an inverse relationship between major U.S. taxes and government revenues, they do not necessarily invalidate the claim that these taxes should be lowered. Even on the normal range, taxes may be higher than desired by voters. Preferences can change over time, voters may now demand fewer public goods, and they can legitimately request a tax decrease. Though incentive effects can be important even if they do not have perverse effects on revenue, the point is that the "economics of the tax revolt" are less the economics of incentive effects and more the economics of public choice.

5. In general, the location of the curve depends on consumption behavior, production technology, and other circumstances in the economy. In wartime, for example, individuals might be willing to work harder at higher tax rates to generate larger tax revenues. Later sections estimate the curve with a model of the 1973 U.S. economy.

6. The elasticity of factor supply is the percentage change in the quantity of the factor supplied in response to a percentage change in the price of that factor. For example, the elasticity of labor supply is the percentage change in the quantity of labor supplied in response to a one percent change in the net-of-tax wage.

7. Other interesting claims of Wanniski include "if the tax rate is zero . . . production is maximized," (page 97) and "revenues plus production are maximized at [the peak of the curve]" (page 98). Walter Heller (1978) has his own complaints about Wanniski's evidence: "At a time when only a few million Americans paid income taxes and Federal spending was less than 5 percent of GNP (it was 3 percent in 1929), we are asked to believe that federal income tax cuts alone powered the growth of GNP from $70 billion in 1921 to $103 billion in 1929." Arthur Laffer, on the other hand, calls Wanniski's book "the best book on economics ever written."

8. Kiefer would seem to have in mind the Keynesian model of an economy suffering from insufficient aggregate demand, resulting in substantial involuntary unemployment of labor and other resources. The Keynesian model is not comparable to the model Laffer and his supporters are using because the former assumes the existence of substantial price inflexibility, while the latter uses an equilibrium model in which prices move to eliminate all excess demands and supplies. Nowadays economists resolve the conflicts between the two types of models by saying that price inflexibility can occur only in the "short run" and must disappear in the "long run," so that Keynesian models are more relevant in the former case and equilibrium models are more relevant in the latter case. For the rest of this paper we implicitiy take the long-run point of view.

9. The utility function contains information relevant for determining the satisfaction an individual derives from consumption and leisure.

10. If one receives income P in the present period, one can invest it at the prevailing interest rate r, and n periods later one will have $P(1+r)^n$. Income received in the present period is worth $(1+r)^n$ times the same dollar amount received n periods later, so the future income must be discounted by $(1+r)^n$.

18. The difference between paying people who don't work and paying people not to work is the difference between a lump-sum payment and a marginal payment with incentive effects. Legally, an employee must be laid off to be eligible for unemployment compensation. A worker can ask to be laid off, but employers may be reluctant to circumvent the intent of the law. These transfers are not automatically and fully available to non-workers. Similarly, Aid to Families with Dependent Children (AFDC) payments are designed to select recipients by particular characteristics that minimize disincentive effects. Social security payments are higher for the blind or disabled. Finally, note that these transfers, to the extent that they are disincentives, do not apply to most labor supply decisions. If a person has been working 40 hours per week and decides to work 39 hours instead, he usually does not become eligible for transfers at all. Laffer (1978) states correctly, however, that "if transfer payments included 'means', 'needs', or 'income' tests they too should be included [as disincentives]." Another more thorough study could undertake to measure incentive effects of transfers.

19. Over 40 simulations were performed in seeking a prohibitive area for capital taxes. Using the dynamic version of the model, rates were increased to 83 percent of gross capital income, savings elasticities were increased to 4.0, and equilibria were calculated out to fifty years in the future. There was not a single case discovered where total revenues were less than the revenues associated with a lower tax rate for the same period. Inverse relationships between tax rates and revenues may exist for high effective rates of tax on certain types of real capital income for certain individuals. No overall inverse relationship was discovered in this model, however, because the tax applies to the savings decision, while savings are only an increment to the capital base. More than fifty years would be required for the tax base reduction to offset a tax rate increase and result in lower revenues.

20. The model measures labor income after the industries' factor tax but before the individual's personal income tax. Since the factor tax is 9.1 percent of labor income, and personal tax is another 1 percent to 40 percent of marginal labor income, the tax rate can be expressed as 10 percent to 45.5 percent of labor income gross of all taxes.

21. For those who wanted a higher tax rate to account for the disincentive effect of welfare programs, the personal income tax could roughly compensate for the ignored potential disincentive of the transfer payments.

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